VIA ELECTRONIC MAIL,
AND U.S. MAIL

December 22, 2006 SR-6J

Mr. Jerry C. Winslow
Principal Environmental Engineer
Xcel Energy
414 Nicollet Mall (Ren. Sq. 8)
Minneapolis, Minnesota 55401

RE: Comments on Xcel's Response to EPA's Comments on the
Draft BERA, Ashland/NSP Lakefront Superfund Site

Dear Mr. Winslow:

On September 1, 2006, the United States Environmental Protection Agency (EPA) sent Northern States Power Company (NSPW)/Xcel Energy's (Xcel) comments on the draft Baseline Ecological Risk Assessment (BERA) for the Ashland/Northern States Power Lakefront Superfund Site. On October 27, 2006, Xcel sent responses to EPA's comments. Pursuant to the Administrative Order on Consent (AOC), EPA requires Xcel to make modifications to the BERA based on the comments provided below. In addition, please make modifications to the BERA based on the comments you agreed to in the October 27th response letter. Under Section X of the Administrative Order on Consent (AOC), this letter constitutes a notice of deficiency and Xcel has 21 days to cure the deficiencies before EPA makes modifications to the BERA pursuant to Paragraph 21(c). Xcel is receiving the letter today, starting the 21 day clock to incorporate these comments and submit the revised BERA by January 12, 2007. Xcel requested additional time and by this letter EPA is giving Xcel another (13) days, until January 25th, to submit the revised BERA.

General Comments

1. **Response to Bioassay Issue:** Here are EPA's perspectives on the toxicological information relevant to establishing effect thresholds for PAH toxicity to benthic organisms from bedded sediments at the Ashland site. As you are aware, the nature of the available data do not allow establishment of an effects threshold that is without uncertainty. Three major factors are responsible for this:

    a) Not all studies targeting similar responses find the exact same exposure response profile;

    b) Not all species tested have the same sensitivity;

    c) While several studies have been completed, there remains a substantial gap in the toxicological information for a critical range of PAH concentrations, primarily 600 to 6000 ug/g organic carbon (OC).

These issues lead to differences in interpretation of the potential risks, based on which endpoints and studies are emphasized in the interpretation of the data. In the draft BERA and in subsequent discussions, NSPW has taken an approach that we characterize as highly empirical; it relies solely on statistical significance without considering magnitude of effect, and it does not attempt to integrate information from the site sediments with the larger body of knowledge regarding PAH effects on benthic organisms. We require a broader, more integrated analysis that will better inform risk management decisions, particularly because it allows some interpretation of concentrations within the 600 to 6000 ug/g OC concentration range. In the text that follows EPA attempts to lay out some of the issues involved, and suggest a range of PAH concentrations that will be considered as conveying a range of benchmarks associated with different levels of observed or predicted effect.

In the draft BERA and in subsequent communications, NSPW has proposed a RAO of 5310 ug PAH/g OC based on toxicity to benthic organisms. Within the context of the available data, this appears to be a fairly liberal interpretation of a threshold for substantive adverse effects on aquatic organisms. Relevant issues include:

1) Of the site sediments tested, the sediment with the closest PAH concentration to this proposed RAO is SQT7, with a PAH concentration of 6084 ug/g OC. This sediment caused >80% mortality of *Hyalella* in a 28-d exposure, and complete mortality of *Lumbriculus variegatus* in a 4-day exposure. Suggesting an RAO that is only 13% lower than a concentration causing egregious toxicity to both species of benthic organisms tested does not seem consistent with a conceptual goal of little or no toxicity to benthos. NSPW has suggested that toxicity observed in simultaneous reference sediments reduces confidence in the finding of toxicity to *Hyalella* in SQT7, but the finding of toxicity to *Hyalella* at this PAH concentration is consistent with literature data (see below). Moreover, the sediment was also highly toxic *Lumbriculus*, which did not appear to suffer from the same reference toxicity issues.

2) URS did not succeed in completing toxicity tests on SQT7 or other sediments with midge. However, tests of diluted site sediments conducted by SEH 2001 indicated an EC20 for midge of 4100 ug/g OC. This value is not only lower than the proposed RAO, but was obtained using a dilution series that showed substantially lower toxicity to *Hyalella* than was found by URS in SQT7 and dilutions of SQT1, suggesting that toxicity of those sediments to midge would likely have occurred at even lower concentrations. This suggests strongly that 5310 ug/g OC is not a concentration that would protect against toxicity to *Chironomus dilutus*.

3) Using fluoranthene toxicity data published by Schuler et al (2004; ES&T 38:6247) one can predict effect thresholds for *Chironomus dilutus* and *Hyalella azteca* exposed to PAH. In this study, the water only LC50 for *Hyalella* was 110 ug/l and 59 ug/L for 10-d and 28-d of exposure, respectively, and the 10-d, LC50 for *Chironomus dilutus* was 36 ug/L. Assuming a middle-range Kow and MW as is represented by fluoranthene, and 1.09 as the ratio between the measured PAHs in Ashland sediments and the broader range of PAHs recommended in the EPA

ESB document (Weldon Bosworth, personal communication), one would predict that the corresponding LC50's in Ashland sediments would be 10035 ug/g OC for 10-d *Hyalella*, 5383 ug/g OC for 28-d *Hyalella*, and 3284 ug/g OC for 10-d midge. These values agree very well with measured responses by *Hyalella* to SQT1 and SQT7, and for *Chironomus* in dilutions reported by SEH 2001. Note that these values are for concentrations expected to kill 50% of the tested organisms, which is not a threshold response. An additional adjustment downward would have to be made to relate these concentrations to concentrations that would have minimal effect. Applying even a modest factor of 2 to account for this would bring the 28-d *Hyalella* value down to 2692 ug/g OC and the 10-d *Chironomus* value down to 1642 ug/g OC. These concentrations are clearly much lower than the proposed RAO, but their derivation is consistent with much of the experimental evidence available.

4) The EPA ESB for PAHs (EPA/600/R-02/013) suggests a threshold below which one would not expect acute or chronic toxicity to the vast majority of organisms (approximating 95%). Based on an average MW of 202 and Kow of 5.084, this value is 707 ug/g OC which, corrected by a factor of 1.09, is equivalent to 649 ug/g OC (a more specific value could be calculated from the typical mixture of PAHs observed in site sediments). While this number appears low among those discussed above, it is intended to protect against chronic effects in very sensitive species. Further, it is worth mentioning that SEH 1998 reported some sublethal effects from a site sediment with 584 ug/g OC. Though the interpretation of those test results is subject to debate (e.g., their significance depends in part on the reference sediment to which they are compared) and there are studies of diluted sediments that do not show significant effects in this range, it is not as though there is absolutely no suggestion of the potential for effects in this concentration range.

5) UV studies conducted by URS and SEH indicate that the addition of UV light in the range of that plausibly expected in about 8 feet of water at the site increased toxicity to organisms simultaneously exposed to PAH-contaminated site sediments. NSPW essentially ignored this toxicity pathway in the initial draft BERA; while the results of the studies were presented, the pathway was described as an "uncertainty" and played no role in the derivation of the RAO. Since the studies conducted, including those by URS, were specifically designed to simulate conditions at the site, it seems inappropriate to discount the pathway in the BERA. Techniques exist to extrapolate the available findings simulating 8 feet of water to shallower sediments with greater potential for UV exposure. These calculations should be done to determine whether a site-wide RAO developed without considering UV-induced effects would be protective for parts of the site with higher UV exposure. An example of this was included in our initial comments on the draft BERA.

In summary, the range of roughly 600 to 6000 ug PAH/g OC is the range within which sediment toxicity can be expected to go from minimal to substantial. Unfortunately, as indicated above, this also is the same range over which the site-specific experimental data are sparse. From the discussion above, there is ample evidence to believe that an RAO of

5310 ug/g OC would allow for sediments to remain that would show marked toxicity to multiple benthic species in the absence of UV light, and the potential for even greater effects in areas of the site where UV exposure is high. Table 1 below lists some sediment concentrations pertaining to different levels of potential toxicity.

The site data underlying this analysis are only those data for sandy sediments; data for woody sediments were not included. Toxicity and bioaccumulation studies conducted at the site suggest that on an organic-carbon normalized basis, PAHs in woody sediments are more toxic than those in sandy sediments and show higher bioavailability than is typically observed in sediments with normal, diagenic carbon. Lower partition coefficients for carbon in the form of relatively undergraded woody debris are a plausible explanation for these observations. However, discussions with Xcel/URS have indicated their interest in establishing RAOs based on dry weight (dwt) normalized PAH concentrations in sandy sediments, and applying that same value as the RAO for woody sediments. Based on our review of the data, this approach would be protective against toxicity in woody sediments. We believe that any of the woody sediment samples showing toxicity had dwt-normalized PAH concentrations higher than the dwt concentrations listed in Table 1, even for the URS-proposed RAO of 5310 ug/g OC.

With respect to dry weight normalization, Table 1 shows dry weight normalized values for a TOC of 0.415%, which is the average of SQT1 and SQT7, two sediments which had a large role in defining the toxicity of the PAH mixture at the site. As you can see, these are in the same range as the MEC and PEC concentrations from WDNR guidance. In fact, the URS-proposed RAO of 5310 ug/g OC is exactly the same as the WDNR PEC of 22 ug/g dwt when adjusted to a TOC of 0.415%. This actually makes some sense, as the PEC is a concentration above which effects are expected to be with high frequency, and that is consistent with the available site data.

All of the values discussed are based on toxicity to benthos as assessed through sediment toxicity tests and/or equilibrium partitioning studies. This does not address the relationship between these values and the observed benthic community at the site, or does it address additional toxicity induced by simultaneous UV/PAH exposure. Based on EPA's General Comment #46 in the draft BERA, the benthic community study has tremendous variability; therefore, the power of this study is low.

Table 1

Concentration (ug PAH/g OC)	ug PAH/g dwt. @ 0.415% OC	Comments
649	2.7	Equivalent to EPA ESB; intended to protect sensitive species against chronic effects. Would also be below concentrations of PAHs in site sediments found to cause toxicity to any tested species, with the possible exception of some sublethal effects observed at 584 ug/g OC (SEH 1998).

1642	6.8	EqP prediction of concentration causing low level of mortality to *Chironomus dilutus* in 10-d exposures. *C. dilutus* appears from both field and laboratory data to be more sensitive than *Hyalella*. Longer-term toxicity to *Chironomus* not considered in deriving this value.
2692	11.2	EqP prediction of concentration causing low level of mortality to *Hyalella*; some 10-d lethality to *C. dilutus* predicted by EqP, but not observed in the dilution series reported by SEH (2001).
4100	17.0	10-d EC20 for *Chironomus dilutus* from dilution of sandy sediment reported by SEH (2001). However, this dilution series showed much lower toxicity to *Hyalella* than did other samples, so may underestimate potency.
5310	22.0	RAO recommended in draft BERA by URS. Based on direct testing of SQT1 and SQT7, likely to result in substantial toxicity to *Hyalella* and *Lumbriculus*, and, based on other data, even greater toxicity to *Chironomus*.

2. **Response to General Comment Number 1:** Whole body fish tissue samples presented in Table 14 of the SEH contained LMW PAHs at higher concentrations than presented in Appendix B of the BERA. In the RI the information from previous studies will be integrated with new information. NSPW's opinions on the quality of the previous fish study will be addressed in the Uncertainty Analysis.

3. **Response to General Comment Number 3:** EPCs calculated in the BERA will not include concentrations from locations that may be considered as "free product". These locations will be evaluated separately.

4. **Response to General Comment Number 6:** Please present this discussion in the RI Report and BERA, as this document will be available to many other readers who may also have questions regarding woodchip use.

Specific Comments

1. **Response to Specific Comment Number 3:** Screening of COPCs will be performed using maximum not 95UCL concentrations. Lead and mercury will be retained because their maximum concentration exceeds the TEC. Use of the 95UCL is appropriate in quantifying intake and characterizing risks in Section 6 but not in the selection of COPCs in Section 3.

2. **Response to Specific Comment Number 7:** As ingestion of sediment by mammals is identified as an exposure pathway of concern at this Site in the BERA and in the BERA Work Plan, and the mink is used to represent mammals that consume aquatic organisms, sediment intake will also be quantified for this ROC.

3. **Response to Specific Comment Number 13:** The use of the 4000 mg/kg dietary concentration from the Patton and Deiter (1980) study as the NOAEL for avian receptors is not conservative; the 400 mg/kg NOAEL will be used from this study. At the 4000 mg/kg concentration, liver weight increased 25% and blood flow to liver increased 30%, when compared to controls (Eisler, R. 1987). Polycyclic aromatic hydrocarbon hazards to fish, wildlife, and invertebrates: a synoptic review. U.S. Fish and Wildlife Service Biological Report 85(1.11). While no effects on survival growth, or reproduction were noted at this dietary concentration, the paucity of data for avian receptors combined with information that relatively small percent of the aromatic hydrocarbons contributed by PAHs in petroleum may confer much of the adverse biological effects reported after eggs have been exposed to microliter quantities of polluting oils (Hoffman and Gay 1981; Albers 1983, as cite in Eisler, 1987). In addition, the Stubblefield et al study showed significant reduction in eggshell strength and thickness at the 20,000 mg/kg BW/day dose (as cited in Environmental Contaminants Encyclopedia, Crude Oil Entry, 1 July 1997, National Park Service, Water Resources Division, Ft. Collins, CO); thus, this dose cannot be considered as a NOAEL for HMW PAHs, as presented in Section 5.1.3.1.

   As for the mammalian TRV, the ATSDR document presents NOAELs for reproductive effects of 1-methylnapthalene at 113.8 mg/kg/day and 143.7 mg/kg/day (Geometric mean = 128 mg/kg-day). As 1-methylnapthalene has been detected in sediment and fish tissue, a NOAEL based on this compound will also be considered in TRV development. Based on this evaluation, the selected TRV of 129 mg/kg BW is appropriate.

5. **Response to Specific Comment Number 14:** Our experience concerning use of the BTAG TRVs has been the opposite of this response. Regardless, a consistent approach for developing TRVs will be used, so EPA proposes the following. The primary source of TRVs will be the EcoSSL documents, applying the geometric mean of the NOAELs and LOAELs based on reproduction and growth as the TRVs. Since EcoSSLs are not available for all chemicals of concern, alternative literature sources can then be consulted, again focusing on studies with reproduction and growth endpoints.

6. **Response to Specific Comment Number 16:** Include this rationale for excluding this exposure route in the revised BERA.

7. **Response to Specific Comment Number 19:** The nature and extent part of the RI will evaluate the sediment data on a discrete sample basis.

8. **Response to Specific Comment Number 20:** Using the 95 UCL presumes exposure of benthic organisms to sediments throughout the bay. Calculating PEC quotients on a discrete sample basis is consistent with WDNR and EPA guidance and can be easily added to the Appendix B, Attachment 1 spreadsheets.

9. **Response to Specific Comment Number 25:** The BERA needs to present a comparison to Wisconsin sediment quality benchmarks on the discrete sample basis (see specific comment 19).

10. **Response to Specific Comment on Appendix I:** As the input factors are defined on the bottom of the exposure estimate Tables I-5 through I-12, please provide actual ingestion

rates, area use factors, dietary fractions, and body weights so that a reviewer can check the results without flipping back numerous pages. A reference to the BSAF table and the TRV table will suffice.

If you have any questions or would like to discuss things further, please contact me at (312) 886-1999.

Sincerely,

Scott K. Hansen
Remedial Project Manager

cc: Dave Trainor, Newfields
Jamie Dunn, WDNR
Omprakash Patel, Weston Solutions, Inc.
Henry Nehls-Lowe, DHFS
Ervin Soulier, Bad River Band of the Lake Superior Chippewa
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bcc: File, SR-6J
Craig Melodia, C-14J